CONCEPTS OF COLLECTIVE INTELLIGENCE AND PROCESS OF CREATING A KNOWLEDGE

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Abstract: *The purpose of the article is present the concept of collective intelligence models and their role in the process of creation collective knowledge. The author hypothesized that the Polish education system is dysfunctional for innovation, cooperation and action in the group. Notes that this highly individualistic trend extends to all levels of education, and is specific for the individual-oriented researchers. The author also points out that this individualistic trend is break by the concept of learning 2.0, which becomes the basis for cooperation with others.*

Keywords: collective intelligence, innovation, cooperation, learning 2.0, the open educational resources.

1. CONCEPTS OF COLLECTIVE INTELLIGENCE

Collective intelligence can be understood as the result of common actions of individuals, often supported by computer networks. Don Tapscott and Anthony D. Williams defines collective intelligence as "the cumulative knowledge that arises from the decentralized choices and judgments that are the responsibility of the independent groups of participants" (Tapscott, Williams 2008, 19). The authors note that a key role in the creation of collective intelligence plays technology because computer networks allow for combined intelligence, knowledge and creativity of many people,

contributing to the society prosperity and development (Tapscott, Williams 2008, 69). The term converges with the collective intelligence is the wisdom of crowds. The author of the concept of wisdom of crowds is James Surowiecki, who believes that information is worked out in a group are often better than those generate individuals. The term wisdom of the crowd somehow suggests that we are dealing here with some form of crowd as psychology traditionally understood. This is not (at least in the case of the Surowiecki concept), which indicates that the wisdom of crowds is the result of action collection of individuals who are independent in decision-making (Surowiecki 2004). Gustav Le Bon says, that the crowd does not have a great ability to reasoning, but a great ability to act. According to Bon's in the crowd fades awareness of their own identity, and feelings and thoughts are the same for all members. The author points out that in the crowd we are dealing with the formation of the so-called collective soul, which contributes to the creation of a collective nature "which is governed by the law of mental unity of crowds" (Le Bon 2004, 15). The crowd thinking is far from the effects of collective intelligence. The crowd is characterized by the lack of criticism, difficulties to discern truth from falsehood, the inability to judge rightly, and the tendency to unauthorized generalize (Le Bon 2004, 35). In the case of collective intelligence, we are not dealing with deindividuation, state of limited consciousness, or collective unconscious. While individuals acting collectively, work out commons decisions, their actions are not devoid of individualism. Collective intelligence can be rational and reasonable in their actions, and the crowd generally characterized by lack of reflection, impulsive and instinctive action.

Surowiecki points out that not every mob (group) is wise. To achieve this collective wisdom are needed at least four conditions necessary for the constitution of the collective wisdom: diversity, independence, decentralization and aggregation. Surowiecki defines diversity as the diversity of opinions and the right to express them, regardless of how much they are unconventional. Independence according to researcher, expressed in the fact that the individuals opinions are not determined by the opinions functioning in their environment. This argument is in contradiction with the mechanism described by Elisabeth Noelle-Neumann as the spiral of silence. This researcher, argues that it is unlikely that a man loudly voiced their opinions, when he thinks he is in the minority. As a rule, articulating their

own opinions we refer to the current knowledge and our common sense of beliefs about what opinions are prevail in society. Key role in formulating our opinion played mass media, because they broaden the scope of our direct observation. People are afraid of rejection induced by the opinions not compliant with the prevailing climate of opinion, what the researcher calls "fear of isolation". People watching responses of the environment, perfectly realized which their behavior/opinions are approved and which are not. To avoid an isolation they refrains from uttering an opinion contrary to the opinions of the majority (Noelle-Neumann 2004). Surowiecki, however, is aware of the fact that the crowd may make bad judgments, because the members of the crowd were too conscious of the opinions of others and rather reinforce their own opinions under the influence of others than pursue their own beliefs. Probably a significant role plays here homofilia rule, understood as our preference for similarity, which makes the people tends to surround himself with people similar to them in terms of several variables: age, education, profession etc. Decentralization is expressed according to the scientist through specialization of individuals and the use of everyday knowledge, and aggregation means a tendency individuals to express their own judgments in decisions taken collectively (Surowiecki 2004).

In addition to the concept of wisdom of crowds, converging with the concept of collective intelligence in the literature works the concept of symbiotic intelligence, which is attributed to Norman L. Johnson. Johnson takes the view that the symbiosis of humans and intelligent networks, leads to collective problem solving, which are the result of selecting one of many possible solutions (Johnson http://collectivescience.com/ symintel.html).

Satish Nambisan and Sawhney Mohanbir note that as a result of collective cooperation constitutes a "global brain". Global brain is a metaphor of connecting people through the operation of information and communication technologies which connect them in a "ecological" whole. As the Internet becomes faster, and its extent is global, connecting many people and becomes a global brain of humanity. This term created in 1982 by Peter Russell which comparing society connected through computer networks to the brain. Russell heed an attention to the processes occurring in the brain of the human embryo, which passes through two major phases of development. The first is the huge explosion in the number of nerve cells. From the eighth week after conception, the number of neurons is increased by many millions in one hour.

After five weeks, the process slows down, brakes, which concludes the first stage of brain development. The brain then goes to the second stage of its development, in which billions of isolated nerve cells begin making calls to each other. At the time of birth newborn nerve cells may communicate directly with thousands of other cells. Brain development after birth is subject to the further process of the spread connections. Until adulthood, many nerve cells make direct connections with the quarter of the millions of other cells. According to Russell, similar trends can be observed in human society. In the past few centuries, the number of "cells" in the brain has a global proliferation. Although population growth is now slowing down in the same breath we move to the next stage of human relations in which billions of human minds are connected into one integrated network. The combination of communication networks and society makes it begins to resemble the planetary nervous system. Russell points out that when it comes time to communicate our planet has shrunk so much that the other cells of the global brain, are not farther than a man limb from his brain (Russel 1982). Thus, the vision of a McLuhan global village becomes today a reality.

Nambisian and Sawhney believes that the term global mind should be interpreted as differences in the partners participating in the process of innovation in terms of industry knowledge, creative input, but also the competence, education and geographic location. In the search for innovative ideas, companies are increasingly turning to external partners' support. This process applies not only to companies but also scientists, researchers. Nambisian and Sawhney observe that innovation in the companies were created while maintaining secrecy, confidentiality, today to compete, grow, companies must be open to cooperation with the external environment (Nambisan, Sawhney 2007). Theory of global mind is close to the concept of the Teilhard de Chardin noosphere who defines it as the sphere of human thought. This term comes from the Greek nous (νοῦς) - mind and sphaira (σφαῖρα) - the sphere. For Chardin's noosphere represents the unity of souls (de Chardin 1966, 63) and he was convinced that the strength of connections between individuals will continue to grow (de Chardin 1966, 17-18). It is worth noting that the Greek nous, from which derive from the concept of the noosphere, does not mean the reasoning skills of average mind, but the ability of intuition, the ability to cross the multiplicity of discourses, to overcome them vision of unity. For the Greeks, nous was a

form of spiritual mind, which is primarily used as an instrument of transcendence (King 1989, 81). The idea is assigning matter features of not only of life, but consciousness is analogous to the human psyche we find also in the panapsychism concept. This term is a portmanteau of word pán - everything and psychḗ - breath, soul. This term is coined by Italian philosopher Francesco Patrizi in the sixteenth century. It means that all things have their mental aspect, and all objects are connected by a single experience or points of view. Panapsychism is a doctrine, which assumes that the mind is a fundamental feature of the world, which exists throughout the universe (Seager http://plato. stanford.edu/ entries/panpsychism).

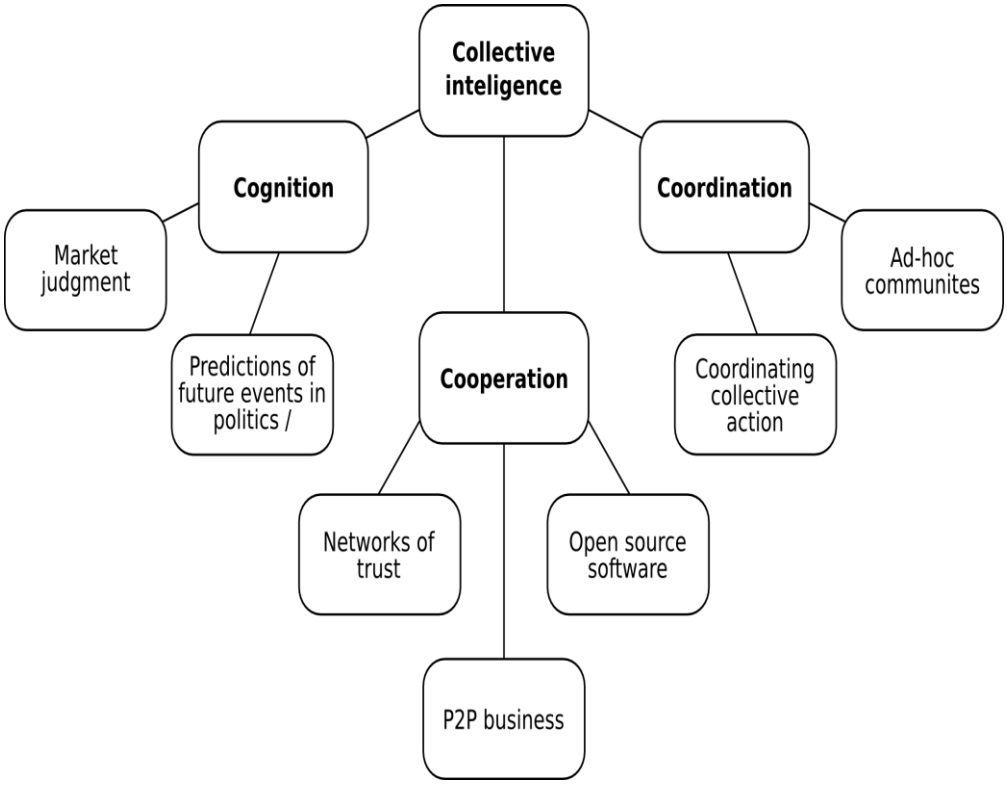

Figure 1. Model of collective intelligence

Source: own, based on: O. Generozova, http://en.wikipedia.org/wiki/File:CI_types1s.jpg, access: 12.07.2011.

2. COLLECTIVE WORK AND POLISH MODEL OF EDUCATION

Unfortunately the Polish education system is dysfunctional for the process of creativity, innovation and collective work. P. Dobrowolski makes accurate diagnosis of the Polish school: "The Polish meaning of education is dominated by the Enlightenment thinking that the child is a tabula rasa (clean sheet), which adults need to save the wise information. Not for us ideas of American educators, who are already in the late nineteenth century, offered to children from fifth grade to allow a significant portion of courses to choose. They knew by then that the true motivation for learning comes from the choice of what interest and gives somebody a joy. Us somewhere the 200 years between modernity and Enlightenment escaped and Polish schools still rely on long-outdated theories. The mainly principle remains compulsion to memory assimilate a resource of knowledge specified in the ministerial directives. Independent thinking is a vice, working in the group is suppressed, and the issues of developing the individual talents of children remain insignificant" (Dobrowolski 2009). It is not important whether the child thinks, most important is the ability to enter the key and can interpret the poem interpret the poem (the best analogy, as a teacher).

Educators seem to displace from the awareness the fact that today the average college student spends less than 5000 hours on reading, but over 10,000 hours playing video games, 20,000 hours watching TV. Computer games, email, internet, cell phones and instant messaging are integral parts of their lives (Prensky http://www.marcprensky.com/writing/Prensky%20-%20 Digital%20Natives,%20Digital%20Immigrants%20-%20Part1.pdf). How, then this virtual, constantly changing environment, combined with a static, one-sided, passive teaching observed in many Polish schools?

According to Tapscott this model of education has no raison d'etre. Students want to consider education as a good and interesting game. Digital generation is smart but impatient and does not agree to passive listening sided lecture. Tapscott believes that teachers need to come down from the cathedral, to begin to listen and talk, they should encourage students to independently explore the world, but not limited to controlling information (Tapscott 2010, 230-237). What is the cause, so a significant gap between what students expect, and how the teaching process is realized? Helpful in clarifying this issue seems to be the concept of digital natives and digital

immigrants Marc Prensky. Digital natives were born after 1983, growing up in an environment of new technologies. Growing up in an environment highly technological, makes the virtual environment for them primary, natural environment. When it comes to acquiring knowledge digital natives quickly get bored, they have difficulty understanding the long and complex text, preferencing picture and sound. Mobile devices are for them essential personal items, which bind their daily existence, the Internet language is their lingua franca. Digital immigrants (most of today's educators) are a persons born before the 1983. In the process of teaching they prefer patient and regularity. They have problems with understanding what is happening in virtual reality. Against the new media they are suspicious (Prensky http://www.marcprensky.com/writing/Prensky%20-%20Digital%20Natives, %20Digital%20Immigrants%20-%20Part1.pdf). Digital immigrants, therefore, although trying to learn the new media language, trying to decode the meaning assigned by young people to new technologies, similarly as immigrants usually remain outsiders, not assimilating to the environment of cyberspace. Although they usually overrun the ability to use the Internet and computer, the use of these tools is not a natural part of their everyday life.

Table 1.

Characteristics of digital natives and digital immigrants

Digital Natives	Digital Immigrants
prefer text	prefer image and sound
quickly get bored, they are impatient	systematically
prefer free access to information	prefer one-sided model of teaching
new technologies treat confidently, creatively	new technologies treat with caution

Source: own, based on: M. Prensky, Digital Natives, Digital Immigrants, 2001, http://www.marcprensky.com/writing/prensky%20-%20digital%20natives,%20digital%20immigrants%20-%20part1.pdf

As Henry Jenkins rightly notes the school as an institution responding with a delay to the emergence of new participatory culture. New skills that students should possess today boil down to (Jenkins, Clinton, Purushotma, Robison, Weigel http://digitallearning.macfound.org/atf/cf/%7B7E45C7E0-A3E0-4B89-AC9C-E807E1B0AE4E%7D/JENKINS_WHITE_PAPER.PDF):

- Play: the capacity to experiment with one's surroundings as a form of problem-solving,
- Performance: the ability to adopt alternative identities for the purpose of improvisation and discovery,
- Simulation: the ability to interpret and construct dynamic models of real-world processes,
- Appropriation: the ability to meaningfully sample and remix media content,
- Multitasking: the ability to scan one's environment and shift focus as needed to salient details,
- Distributed Cognition: the ability to interact meaningfully with tools that expand mental capacities,
- Collective Intelligence: the ability to pool knowledge and compare notes with others toward a common goal,
- Judgment: the ability to evaluate the reliability and credibility of different information sources,
- Transmedia Navigation: the ability to follow the flow of stories and information across multiple modalities,
- Networking: the ability to search for, synthesize, and disseminate information,
- Negotiation: the ability to travel across diverse communities, discerning and respecting multiple perspectives, and grasping and following alternative norms.

A situation in which the teacher has a complete knowledge and play the role

of the person who only carries into effect the provided knowledge is slowly retreating into the past. As rightly notes the authors report *Young and the media. New media and participation in culture*, favorable for both parties is situation when the teacher is simply a partner (Filiciak, Danielewicz, Halawa & others 2010, 124). Increasingly this is that the lecturer/ teacher gains knowledge from their students/pupils. Some teachers break yet functioning among educators convinced of his own omnipotence, realizing that no one knows everything. However, the full democratization of the learning process is far away for us. According to Henry Jenkins we can do much to the educational process for students has been interesting and inspiring. Teachers of history might, for example, together with their students to discuss alternative scenarios of historical, to speculate on what might happen if for example Germany won World War II, or Native Americans colonized Europe. There is no right or wrong answers to these questions, while they may inspire your own research. This type of tasks place emphasis more on creative thinking rather than knowledge reproduction, at the same time allow students to feel less intimidated by teachers and experts (Jenkins, Clinton, Purushotma, Robison, Weigel http://digitallearning.macfound.org/atf/cf/%7B7E45C7E0-A3E0-4B89-AC9C-E807E1B0AE4%7D/JENKINS_WHITE_ PAPER.PDF). Passionate may offer as much as a scientist, an expert and his knowledge becomes as valuable as knowledge expert. Thousands of volunteers can quickly and efficiently create innovative and good projects. The initiators of social projects which created together on the Internet (which a perfect exemplification is Wikipedia), assume good will and responsibility of their contributors. Partnership production, based on the ideas of the common good (common-based peer production), allows to create from the dispersed activities of many volunteers a valuable whole (Hofmokl, Tarkowski http://www.ebib.info/2006/73/hofmokl_tarkowski.php). In the social production of content is not only a lack of hierarchy (which determines the image of individual tasks), but there is no limit to the number and composition of the team Hofmokl, Tarkowski http://www.ebib.info/ 2006/73/hofmokl_tarkowski.php). Therefore, while such projects may work with everyone, regardless of whether a layman or an expert in the field - just the good intentions, internet connection and computer.

3. POLISH INNOVATION

The *Report on Innovation of Polish Economy* rightly noted that universities are indeed forging talents, but they are not sources of innovation (Bendyk, Czechowicz, Fazalgic & others 2011, 16). Schools and universities do not teach team work, team projects carried out are rare. The authors note: "In schools and universities promotes individualism, while the most important is teamwork" (Bendyk, Czechowicz, Fazalgic & others 2011, 22). Teachers have a problem with the assessment work, which are the work of many people, hence the preference for individual projects, which are easier to evaluate. In many cases, teachers even kill this creativity, are reluctant to tolerate going beyond a strictly defined program and standards. It is well seen when a child sticks to the canon and does not go beyond what is realized in the classroom. Almost the only form of expression is the student's test, class test or oral statement at the board. Design work, visualization, group preparing mock-ups, is in a Polish school absent elements. Even if teachers decide to design tasks, they are so flexible and banal that the students rewrite them from the internet. There are even those teachers who require strict command execution, and failure to comply with them, even if it was for developing the student is punished. Far more important than learning for creativity, is to develop an absolute obedience to the teacher. This authority is not built on values, rather fear, coercion. P. Dobrowolski notes: "The officials, teachers, and probably the majority of Poles cannot imagine how you can lead a lesson where every student has read another book" (2009). And yet very aware of their own choice, not imposed from outside can make that a child will reach to read with passion and interest. Unfortunately, sometimes it happens that "the role of the Polish teacher is catching student's on ignorance and punish him for it. (...) Talk about the difference of views is not likely to happen, because I might disturb the flow of rework the material. And that any teacher is not needed. It is hardly surprising that so trained Pole has problems of substantive discussions, search arguments, defending their case, convincing others to them and propose a compromise. Prefer to be surrender, because in the course of education, such behavior was rewarded" (Dobrowolski 2009). Why, then, these same teachers who premium on passivity and blind obedience, mediocrity, and then complain students lack creativity, creative thinking, or criticism. If they only require from their students is playing by heart unreflecting of rules, where and when could

appear that time of reflection? Stanislaw Ossowski, wrote that the role of universities is to develop attitudes, which he described as “disobedience in thought”. However how develop in students the attitude, negative to the entire school stage of socialization? How to convince students that studying is not just a utilitarian stage of their lives, but also the stage broaden their horizons, develop their own passion. Market requirements, may not be in contradiction with the idea of the university. It is worth noting that in many cases, non-institutional action brings much better results than the operation within the structures in which most of the steps is a routine, precisely defined, which implying a loss of creativity and creative ferment. Roman Galar writes: “98% of the radical improvements comes from the laboratories of small businesses - those whose owners (often also the originator) are risking their own independently resources” (Galar 1990, 101). Thus, the so-called critical innovation, do not stem from 98% in universities or large corporations, but in small laboratories, garages.

4. SCIENTIST INDIVIDUALISM AND GROUP COOPERATION

Unfortunately, in many cases we do not want to share our ideas with others. This distrust of others leads to an attitude that expresses itself in fear "that someone would steal us our original idea, and therefore hide it in the drawer” (Bendyk, Czechowicz, Fazalgic & others 2011, 24). No exchange, eliminating the potential, often very creative criticism makes the idea is dying before it can even sprout and give fruit. Sharism culture[1] is contrary to the individualistic and conservatively oriented Poles. Unfortunately, few of us can and want to work as a team. The report's authors note on the Polish innovation “Poles tolerate only short-lived compounds, such as confederations, inns, kidnapping women, sleigh rides” (Bendyk, Czechowicz, Fazalgic & others 2011, 25).

In science, referring to other authors is extremely important and valuable, but the authorship as such, is not blurred. As noted by Andrzej Radomski: „It appeared that the humanist work is simultaneously a kind of expression of

[1] Sharism is a concept known as the revolution of the spirit. Its guiding principle is the idea: The more you share, the more you get. This ideology promotes a culture of sharing as a way of society and economy. This concept is based on models of collective intelligence, free software and open source, free culture and creative commons.

maker: his personality, consciousness, experience, biography, value system, etc. factors. Authorship of various works becomes the basis for their science careers: promotions, awards, authority, prestige and fame" (Radomski 2010, 105). However at the same time, the author notes that many papers hide authorship of certain concepts, but it's not about masking one's conscious creativity, but such a number of inspirations, reflections that arise after reading the previously works. Consequently, it is difficult not to agree with Radomski who believes that even in science the mechanism of the collective intelligence works, because if taken into account all those who have contributed to creation, we are always dealing with the collective activities (Radomski 2010, 106). In many cases, the reviewers, but also the first authors of the article/book, significantly affect the shape and character of work. Ludwik Fleck notes that knowledge have social character, since almost every exchange of ideas leads to a situation where there are ideas, concepts and standards are difficult to assign a particular individual. This raises the kind of collective thinking (Denkkollektiv), which is characteristic for a certain style of thought (Denkstil) (Fleck 2006, 325), which also provides the discriminant of this group, distinguishing it from other schools, trends, styles of thought, etc. Fleck takes the view that the collective nature of scientific knowledge becomes evident today, as support by the mechanisms of group cooperation, group co-authored many scientific publications, a large number of journals, surveys, conferences, symposia, committees, meetings, societies and congresses, which in turn implies that that every scientific cognition is social action, because in fact refers to the knowledge and skills provided by others. Fleck in their deliberations concerning the collective nature of scientific knowledge, goes a step further - even says that a single, isolated man would be condemned to intellectual sterility (Fleck 2006, 325-327). Is difficult to disagree with this statement. Conferences, symposiums, congresses, are not only social gatherings, they are primarily oriented meetings to what others are doing in my field, what new, interesting topics were raised by colleagues, as well as the possibility of cooperation. Sometimes a single sentence, an intriguing thought, fertilizes our mind, not allowing the rest, until it is at least partially the answer to our question. Collective work, forcing scientists also external factors. Progressive complication of the social structures, their increasing complexity, implies pressure to undertake multidisciplinary research and cooperation, which facilitates understanding and clarifying many issues. Increasingly longer

unsufficient tools and methods that use the representatives of the discipline. Scientist have to reach for the methods and tools developed on the basis of other disciplines.

As evidenced M.E.J. Newman average number of authors of scientific papers over the last sixty years has increased considerably in many areas doubling or even succumbing tripled. In the case of computer science today, the average article has 2 authors (2.22), in physics 3 (2.66), in astrophysics 3 (3.35), in biomedicine 4 (3.75). Even more surprising fact that there are works which have from 200 to 500 authors. Newman points to the collective record-breaker, work with a 1681 (sic) authors (2000). Unfortunately, these seemingly optimistic analysis of Newman, still confirm the individualistic-oriented work of the humanities and social sciences.

5. SCIENCE 2.0

Modern science through the spread of online communication tools, moving towards a model called science 2.0. D. Tapscott and A. Williams wrote: "Here comes the new era of collaborative learning, which will significantly accelerate the process of scientific experimentation and learning. With the new open publications and new Internet services, the vast knowledge resources will be put in the hands of individuals, communities and partner network will entwine the world (...) Science, requires access to ideas, knowledge and culture created by others now and in the past. (...) Science has become a public good, and not the exclusive property of the privileged few" (Tapscott, Williams 2008, 220-224). According to researchers, science 2.0 is mainly based on co-teaching, in which the Internet becomes a workspace for many people involved in science. Internet at an unprecedented scale allowed collaboration the specialists in many fields, efficient and quick reviewing of articles and research projects. According to the study S. Cisek science 2.0 appoint three trajectories (Cisek http://informacjacyfrowa. wsb.edu.pl/ pdfs/nauka%202.0.pdf):

– widely understood communication in scientific, dissemination of research results, improving the exchange of ideas and development of cooperation between scientists, breaking the barriers between disciplines, etc.,

– development of scientific knowledge and understanding of term "scientific" in general, for example in the context of the review (peer review, the classical verification versus social verification), recognition of the publication as a scientific, philosophical problem of demarcation of science and non-science, for example: Who is "better" qualify method/ knowledge as science - a single genius, traditional structures and procedures, or "collective intellect"?,

– organizational and social aspects of science, the emergence of virtual communities of scholars, the emergence of authorities.

It should be noted that the restriction to demonstrate the changes of a functional nature, i.e. to facilitate communication (fast and effective communication), organizations (the affiliation to the organization of conferences, meetings) would be unauthorized simplify the term science 2.0. We are dealing with the changing paradigm of science that is based on cooperation, openness of knowledge, which allows changing the essence of science and scientific. Thus, positive and negative effects of science defined as 2.0, can be reduced to (see Table 2):

Table 2:

Properties of science 2.0

Features	Positive consequences	Negative consequences
(1) ease and speed of publishing (2) potential immediacy of access	- rapid dissemination of both opinion and scientific discoveries, without going the traditional, often lengthy process of publication in journals, - conduct discussions and exchange views in almost real time, - acceleration of information flow in science	- spread, unchecked, and even fraudulent or dangerous contents

(3) potentially universal access	- possibility of effective dissemination of research results among the general public and for formal education and self-education, - facilitate the "migration" of knowledge between disciplines, interdisciplinary science increase	
(4) often informal in nature - resulting in the reduction of barriers to science communication: linguistic, social and other	- openness and pluralism, - turning to the discussion of students, amateurs, novices, sometimes offering a fresh look at "old" problems - free market of ideas	- the appearance of expression worthless in terms of content, too emotional, or even offensive
(5) visibility and increasing the role of the community of scholars 'collective mind'	- intensification of social control, including easier to "capture" plagiarism, - perhaps - faster development and improve the quality of research through facilitated discussion, cooperation and mutual inspiration	- publication of the personal conflicts - black PR

Source: own, based on: S. Cisek, Nauka 2.0: nowe narzędzia komunikacji naukowej, Nauka 2.0: nowe narzędzia komunikacji naukowej, http:// informacjacyfrowa.wsb.edu.pl/pdfs/nauka%202.0.pdf, access: 14.07.2011.

As stated by P. Levy "Nobody knows everything, everyone knows something. All knowledge has humanity" (1997, 20), every surfer which is not an expert in the field has much to contribute to the project. By an open publishing is possible a process of propagation of knowledge, which is often had been limited to niche specialists in the field. Unfortunately, many professionals are not open to collaboration, restricting itself to its network of small worlds. Distance have no longer any meaning today, the Internet enables the cooperation of everyone interested in a given issue. Time and space are not limiting factors today, the problem is rather large dispersion of Internet resources. Scientists have at their disposal thousands web sites that have them

facilitate collaboration and cooperation. In our country we have at least dozens of such sites. Their form, however, is more like a static internet web 1.0 formula, than the dynamic internet web 2.0. Usually on such Web sites are typically information content, sometimes with the possibility to comment on published articles, but rarely with the possibility of synergy, whereby the effects of working together far outweigh the summed actions of individual units. Learning 2.0, and in fact postscience characterized full egalitarianism, equating the status of expert and amateur. Freshness of view, in many cases guarantee creative ferment, originality gaze, the free market of ideas, liberated from restrictive pattern. A. Radomski writes: "Many interesting problems humanities could be discussed and solved in the framework of collective intelligence. Here, no longer mattered scientific degrees and titles, just ideas and imagination. Participate in the collective minds can people would also not related to every day of science - in line with the slogan: everyone can be learned, anyone can carry on constructive knowledge" (Radomski 2010, 69). This open paradigm of science in many dimensions met with sharp opposition from the scientific community, are reluctant to equate the status of the position of an amateur scholar, layperson, hobbyist. Stuck in a warm cocoon of their own degrees, habits, value their status quo. Even publishing in the most prestigious journals of his field effects they are limited to a dozen experts in their field. Open publishing significantly broadens the circle of readers, making a living thought and be creative reinterpretation. Often, however, scientists are afraid of openness, treating it as a threat, and receive any form of criticism threat as *ad personam*, negating the possibility of other creative influence on the shape of their works.

To increase the potential of public works (including the publication of a scientific nature) is postulated on the basis of publishing OER Open Educational Resources which are defined as materials that are publicly available on the internet (no access control) published together with the right to further use and develop in an open manner (Grodecka, Śliwowski 2011, 6). OER use free licenses, which in practice means that it is permitted Grodecka, Śliwowski 2011, 7):

- re-use of materials developed by others,
- change, transform, adapt to their purposes and needs (eg, translate texts in foreign languages),

– combining with other materials (re-mixing songs, such as text with audio),

– re-distribution - to share their work with others.

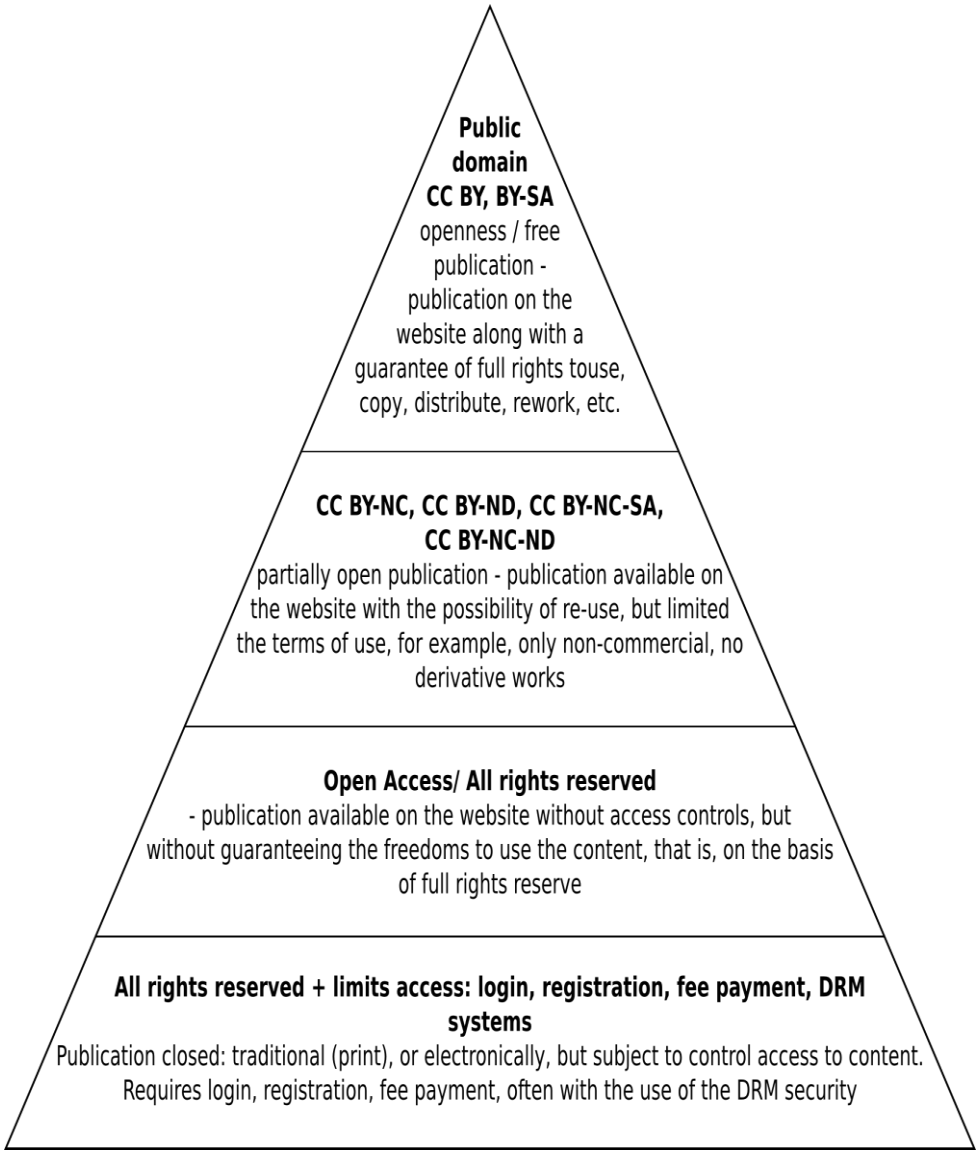

Figure 2. Levels of openness

Source: own, based on: K. Grodecka, K. Śliwowski, Przewodnik po otwartych zasobach edukacyjnych, Koalicja Otwartej Edukacji, 2011, s.13.

The idea of the openness of the work is based on the belief that knowledge is a common good and everyone should have the right to adapt it to their own needs, improve, modify.

CONCLUSION

Contemporary knowledge creation is significantly transformed. New technologies at the forefront of the Internet contribute to the changing paradigms of knowledge creation and practice of science. The constant social change, complicating the social and cultural mechanisms requires the cooperation of scientists from many disciplines. Scientists are increasingly aware, in order to effectively respond to environmental problems, it is necessary co-operation of specialists from different fields of science. At the same time easy access to alternative sources of information, the common of the media, will undermine their monopoly on the provision of certain knowledge. Publishing and reviewing mechanisms are changing the results of their scientific work, which increasingly has an open character, which favors the propagation of knowledge and widens the circle of potential readers. We pass from the model of the cathedral, so the creation of employment-based professionals, scholars, to bazaar model, in which everyone - even a layman and an amateur can contribute to building a common knowledge. Pupils rejecting authority, reject the dogmatic truths communicated to them ex cathedra. They want to discuss and cease to treat their teachers as oracle.

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